

CONNECTING DISTRICT 123

Fiber Expansion, the BEAD Program, and the Gaps Nobody in Jeff City Is Talking About

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EXPERIENCE: WHO'S TALKING AND WHY IT MATTERS

Most politicians talking about rural broadband are reading from a briefing sheet.

I'm not.

For 20 years in the **United States Air Force (USAF)**, I worked as an **Advanced JICC Operator** — JICC stands for **Joint Interface Control Cell**.

In plain language: I was a multi-platform network architect and manager.

My job was making sure that communication systems from different military branches, different allied nations, and different technology generations could talk to each other reliably in joint operational environments — under pressure, in contested conditions, when failure was not an option.

A JICC sits at the intersection of every network in a joint operation.

As an **AJO (Advanced JICC Operator)**, you are the person who knows what every system can and can't do. You know the difference between a dedicated circuit and a shared pipe. You know what happens when a link degrades under load.

(But what's a link, Hutch?! In networking, a **link** is simply a connection between two points that carries data. Think of it like a road between two towns.)

That background is why I can tell you with confidence that what the federal government is currently allowing under the **BEAD (Broadband Equity, Access, and Deployment)** program is not reliable broadband infrastructure.

And honestly, I feel like someone needs to advocate for rural America properly.

SECTION 1: THE TECHNICAL CASE AGAINST LEO AS INFRASTRUCTURE

The Trump administration restructured BEAD in June 2025, declaring the program “technology neutral.” Under this change, LEO (Low-Earth Orbit) satellite providers like Starlink and Amazon's Kuiper can now compete for BEAD funding on equal footing with fiber providers — as long as they claim to hit the minimum speed threshold of 100/20 Mbps (100 Megabits per second download, 20 Megabits per second upload).

On paper, that sounds reasonable. In practice, as a network architect, I can identify at least four distinct technical failure modes that make LEO satellite fundamentally unsuitable as permanent rural broadband infrastructure. Let me walk through each one.

Gap 1 — Shared Medium: The Pipe Isn't Yours

Dedicated Bandwidth vs. Shared Medium

When you have fiber to your home, you have a dedicated circuit. That means the bandwidth you pay for is reserved for you. Your neighbor streaming a movie does not affect your video call. A hundred new residents moving into your area does not degrade your service. The pipe is yours from the node to your house. Period.

My Co-Mo Connect fiber delivers **1 Gbps (1,000 Mbps) as a guaranteed floor**. Not a ceiling. Not an “up to” speed. A floor. That's the minimum I get — regardless of what my neighbors are doing, regardless of the weather, regardless of how many new subscribers sign up down the road. The pipe is mine. Every bit of that bandwidth is reserved. That's what dedicated means.

The SAT-J Lesson

Let me take you to the way-back machine to explain why I know this matters.

In the military we operated a system called **SAT-J (Satellite Tactical Data Link J)** — military satellite communications. It was, to put it charitably, a nightmare. The link ran at a **2,400 baud rate — that's 2.4 Kbps (Kilobits per second)**. For reference: your old dial-up modem ran at 56 Kbps. SAT-J was roughly 23 times slower than that. But the speed wasn't even the worst part.

SAT-J was **half-duplex with a polling architecture** — meaning only one subscriber could transmit at a time, and a designated **Net Control Station (NCS)** — the poller — had to call each participant in turn just to let them talk. That already-tiny 2.4 Kbps bandwidth was then divided among all the subscribers on the net. The more participants you added, the less throughput everyone got. Add a third unit and everyone slows down. Keep adding and you're barely moving data at all.

And here's the part that should concern anyone thinking about rural emergency communications: **there was no handshake between sender and receiver**. You sent your message into the ether and you *hoped* it got to the right person. No confirmation. No acknowledgment. No way to know if your critical message reached its destination. In a military operation, that's a mission failure waiting to happen.

[INSERT VISUAL: SAT-J bandwidth split diagram]

Now — LEO satellite like Starlink is better than SAT-J. It's full-duplex. The bandwidth is orders of magnitude higher. I'll give it that. But the **fundamental problem is identical**: it's still one satellite handling however many users' traffic. The bandwidth gets sliced. The more subscribers share that satellite cell, the less everyone gets. That is not a fiber problem. That is not a Co-Mo problem. That is the physics of a shared medium — and it hasn't changed since SAT-J. We just have faster shared now.

LEO satellite is a shared medium. Every subscriber within a satellite's coverage cell — potentially thousands of households — is sharing capacity from that single satellite as it passes overhead. When your neighbor is online, you slow down. When a storm keeps the whole lake area home on a Tuesday, everyone's throughput drops together. When a new development

adds 300 Starlink dishes to your coverage cell, your service degrades permanently — and there is nothing you can do about it because the pipe is not yours.

Design Capacity vs. Operational Capacity

BEAD's speed requirement is **100/20 Mbps**. Starlink can hit those numbers — in ideal conditions, low subscriber density, good weather, favorable satellite geometry. But that is a **point-in-time measurement**, not a service guarantee. Fiber delivers 100/20 as a floor. Satellite delivers it as a ceiling — and a theoretical one at that.

In the military, we have a concept called “design capacity” versus “operational capacity.” Design capacity is what a system can do in a lab. Operational capacity is what it actually delivers in the field under real conditions. Every network architect knows these numbers diverge — sometimes dramatically. BEAD is currently using design capacity numbers to qualify satellite as equivalent to fiber. That is not a policy position I can respect. It is not how you build infrastructure. It is how you generate a press release.

Approving satellite as BEAD-equivalent because it can theoretically hit 100/20 Mbps is like approving a dirt road as highway-equivalent because a sports car once hit 70 MPH on it in dry conditions. The average performance under real load is what matters. And satellite fails that test.

Gap 2 — Footprint: You Have to Be Under the Beam

Satellite coverage is often described as if it works like a light switch — either your location is covered or it isn't. That's not how it works. Coverage is a beam, not a blanket.

Think of it this way. A flashlight close to a table illuminates a small, intense spot. Pull it further back and the same light has to cover more surface area — any given point on the table gets less intensity. Pull it to the ceiling and the beam covers the whole room, but each square inch gets almost nothing.

Old **GEO (Geostationary Orbit)** satellites sit at roughly 35,000 km. Massive footprint. Dim, spread-thin signal. High latency — around 500 milliseconds — because the signal has to travel 70,000 km round trip. That's HughesNet and Viasat. Everybody knows it's terrible.

LEO satellites like Starlink sit at roughly 550 km. Much closer flashlight. Smaller footprint per satellite, lower latency around 45 ms. Genuinely better than GEO. But — and this is the part BEAD is ignoring — **every subscriber under that beam is still sharing it.**

[INSERT VISUAL: Flashlight analogy diagram — GEO vs LEO vs Fiber]

The constellation does provide handoff redundancy — as one satellite moves out of range, another takes over. That keeps you connected. But the satellite you hand off to is also a shared pipe with its own pool of subscribers. You've moved from one crowded room to the next crowded room. The dedicated bandwidth problem doesn't move with you.

There's also a regulatory dimension to footprint that doesn't get discussed. The **FCC (Federal Communications Commission)** licenses satellite earth stations under Part 25 of its rules, which requires frequency coordination and interference analysis. The FCC is the body that approves satellite coverage claims — and those claims are **provider self-reported**. The FCC does not independently verify that a covered location actually receives usable service under load. A recent nationwide audit found the FCC's broadband maps undercount unserved

Americans by 33% — reporting 19.6 million unserved when the real number is closer to 26 million. Provider filings overstate availability for fixed wireless at 44.6% of listed addresses and DSL at 48.7%. A 33% mapping error could misdirect roughly \$14 billion in BEAD funds.

BEAD dollars flow based on FCC map data. FCC map data is self-reported by providers. Satellite providers can claim coverage over a huge footprint and get those locations removed from BEAD eligibility — even if actual delivered capacity under real load is a fraction of what they claimed. Coverage is not capacity. The maps don't measure capacity. Nobody is measuring capacity.

Gap 3 — Terrain and Organic Material: The Ozarks Are Not a Parking Lot

Satellite internet requires an unobstructed view of the sky. 5G in its fastest form (mmWave) requires line-of-sight and does not penetrate trees, hills, or buildings. The Lake area's geography is about as hostile to both technologies as terrain gets.

We have deep wooded coves. Thick tree canopy. Rolling hills. Deep hollows between ridge lines. Many homes at the lake are situated specifically to be tucked into the landscape — which is beautiful, but it means there is no clear sky view from the lot.

Satellite dish placement in this geography is a real practical problem. The dish needs a clear view in the direction of the satellite arc. A **single tree between your dish and the sky** degrades your signal. Ice building up on the dish reduces reception. Misalignment from wind or physical disturbance causes dropout. These are not edge cases in the Ozarks — they are the standard landscape.

5G is worse. High-band **mmWave (millimeter wave)** 5G has a reliable range measured in **hundreds of feet, not miles**. It cannot penetrate foliage. It cannot bend around hills. Low-band 5G travels farther but delivers speeds closer to upgraded 4G LTE — it is not a broadband replacement. Building the tower density required for true 5G coverage across the wooded coves of HD123 is not economically viable for any private carrier.

Fiber is buried underground. It does not care about trees. It does not care about hills. It does not care about cove orientation or canopy cover or whether your lot faces north or south. You run it to the house and it works. Full stop.

Gap 4 — Weather: Real and Solar

Real Weather

Starlink uses high-frequency Ku and Ka band signals that degrade in heavy rain. Research shows median upload speeds drop by over 50% during rain events, and outages occur. The Lake area gets serious summer thunderstorms. We get ice. We get snow. Those are exactly the conditions where satellite performance collapses.

Snow and ice are worse. Ice builds up on the dish, making it heavy and less effective. The dish has a self-heating function to melt snow — but it is not foolproof in a sustained Missouri ice storm. Icicles can freeze the dish motor entirely, causing physical damage. The dish has to stay

aligned with moving satellites overhead. Strong winds shift mounts. A satellite dish on a wooded cove lot surviving a February ice storm intact is not guaranteed.

Here's the one that should concern every rural resident: satellite requires continuous home electricity. When an ice storm takes out your power — and it will — your satellite internet goes dark at the exact same moment you need emergency communication. Fiber nodes can run on battery backup. Satellite cannot. That's not a technical footnote. That's a public safety failure.

Solar Weather — The Threat Nobody in Jeff City Is Talking About

We are currently at the peak of **Solar Cycle 25**, which has been more active than the previous cycle. In May 2024, the largest geomagnetic storm in 20 years hit Earth. Nearly 60% of Starlink users experienced degraded service. 40% faced a total blackout. That same storm caused 12 satellites to experience accelerated orbital decay and early reentry.

Geomagnetic storms increase atmospheric density at satellite altitudes, creating drag that alters trajectories, reduces operational lifespans, and forces more frequent orbital maneuvers. SpaceX has to continuously launch replacement satellites just to maintain the constellation. As solar activity increases, these disruption events become more frequent.

Buried fiber is completely immune to solar weather. A geomagnetic storm does not care about the cables under your yard. It cares very much about the satellites overhead.

SECTION 2: THE POLICY AND ACCOUNTABILITY FAILURES

The four technical gaps above are reasons satellite fails on physics and engineering grounds. The following failures are reasons it fails on policy and accountability grounds. As a network architect turned candidate, I consider both categories disqualifying.

Failure 1 — Out-of-State Corporations Extracting Missouri Money

This is the one I want every rural Missourian to hear clearly.

Starlink is owned by Elon Musk. SpaceX is headquartered in Hawthorne, California. **Amazon Kuiper** is owned by Jeff Bezos. Amazon is headquartered in Seattle, Washington. **T-Mobile**, which is pushing fixed wireless as a rural broadband solution, is headquartered in Bellevue, Washington. **Charter Communications/Spectrum**, which provides cable in parts of the Lake area, is headquartered in Stamford, Connecticut.

Every dollar that goes to these providers leaves Missouri. The infrastructure — to the extent satellite and wireless have any — is not owned by Missourians. The jobs are not in Missouri. The customer service is not in Missouri. When prices go up, you have no local recourse. When service is bad, you call a number. When they decide your area isn't profitable enough, they move on.

Co-Mo Connect is owned by its members — your neighbors in Camden County. **Southwest Electric Cooperative** is owned by its members. The money stays in Missouri. The infrastructure stays in Missouri. The jobs stay in Missouri. When something goes wrong, you talk to someone who lives down the road from you.

BEAD is federal money — taxpayer money — meant to build permanent infrastructure in underserved rural communities. Routing that money to out-of-state corporations that refuse performance standards and accountability requirements is not rural investment. It is corporate welfare dressed up as a broadband solution.

The cooperative model built rural electricity in this country without handing the grid to out-of-state utility corporations. We should be doing the same thing with broadband. Missouri money should build Missouri infrastructure owned by Missouri members.

Failure 2 — No SLA, No Accountability, No Recourse

A dedicated fiber circuit comes with an **SLA (Service Level Agreement)** — a legally binding contract that guarantees uptime, response time for outages, and performance floors. If the provider fails to meet it, you have recourse. Credits. Escalation paths. Contract remedies.

Starlink has no rural SLA. SpaceX has actually argued to NTIA that they should not be required to guarantee service to every location they are paid to cover. They want to reserve only as much network capacity as they “determine sufficient” — their words. That is not an SLA. That is a suggestion.

We are talking about routing public infrastructure dollars to a provider that explicitly refuses to guarantee the service those dollars are supposed to deliver. From a network management standpoint, that is not a vendor relationship. That is a blank check.

Failure 3 — The Contention Ratio Nobody Is Modeling

Every shared medium has a **contention ratio** — the number of users sharing a fixed amount of bandwidth. Cable internet typically runs contention ratios of 20:1 to 50:1. Satellite contention ratios are not publicly disclosed by SpaceX — which is itself a red flag — but the physics of a shared orbital cell serving thousands of subscribers suggests they are significantly higher.

Missouri’s BEAD maps are being drawn based on FCC coverage footprints — whether a signal can theoretically reach a location. They are **not** being drawn based on actual delivered throughput under load. Those are very different things. The FCC map says “covered” if a single provider asserts it could deliver the speed tier. It does not test whether actual capacity exists when every subscriber in that cell is online simultaneously.

I have managed networks where the difference between coverage and capacity caused operational failures. In civilian terms: just because the satellite passes over your house doesn’t mean you’re getting 100 Mbps when your entire neighborhood is streaming the same storm coverage during a tornado warning.

Coverage is not capacity. The maps don’t measure capacity. BEAD is allocating \$1.7 billion in Missouri based on maps that measure assertions of coverage, not actual delivered bandwidth under real load. That is a structural flaw in how this money is being spent.

Failure 4 — The BABA Supply Chain Bottleneck

There is a second layer to the BEAD limbo that doesn't get enough attention. The **BABA (Build America, Buy America Act)** provision requires that federally funded infrastructure projects use domestically sourced materials. That is a good policy in principle. In practice, it has created a supply chain problem: local providers like Co-Mo Connect literally cannot get their hands on BABA-compliant fiber fast enough to meet current federal mandates.

This is exactly the kind of second and third order effect that network planners are supposed to identify before deployment — not discover mid-build. If you mandate domestic sourcing without first ensuring domestic supply chain capacity, you create artificial delays that have nothing to do with technical readiness.

Meanwhile, satellite providers are not subject to the same BABA constraints in the same way, because they are not building physical ground infrastructure at scale. So the “technology neutral” policy ends up being technology preferential — toward satellite — in ways that were not advertised. The playing field is not level. It tilts away from local fiber co-ops and toward out-of-state satellite corporations.

Failure 5 — The Ameren Chokepoint

From a network architecture standpoint, the Ameren pole attachment situation is a **last-mile access problem** — one of the most common and most expensive failure points in rural network buildouts.

Ameren Missouri owns **Bagnell Dam** on the Osage River, which means they control the **FERC (Federal Energy Regulatory Commission)**-licensed Osage Project boundary — the shoreline, dock permits, and a significant portion of the physical geography where fiber needs to run to reach cove communities at the Lake.

When Co-Mo Connect needs to run fiber through territory where Ameren controls the poles, they face attachment fees that can make the economics impossible. In Warsaw, Missouri, a local broadband provider was forced to go entirely underground just to bypass Ameren's pole access costs. That is a real-world example of corporate infrastructure gatekeeping adding cost and delay to a buildout that should be straightforward.

In a military context, we call this a “chokepoint” — a single point in a network path that a hostile or uncooperative actor controls, giving them leverage over the entire route. You plan around chokepoints. You build alternate paths. You don't build your critical infrastructure to run permanently through someone else's chokepoint.

Passing pole attachment reform in Jeff City would remove the chokepoint. It would make Ameren a partner in this buildout instead of a toll collector standing in the way of it. That is a solvable problem — if the legislature decides to solve it.

SECTION 3: WHAT REAL INFRASTRUCTURE LOOKS LIKE

Co-Mo Connect — The Proof of Concept

Co-Mo Connect — the broadband subsidiary of **Co-Mo Electric Cooperative**, a member-owned rural electric cooperative — is the closest thing HD123 has to a real infrastructure model. Starting in 2012, they became the first rural co-op in Missouri to deliver **gigabit (1 Gbps / 1,000 Mbps)** speeds without federal funds. I have that service. It is fast, reliable, and stays on through weather that would take satellite offline.

From a network architecture standpoint, Co-Mo's model is correct. Fiber to the home is a dedicated circuit. It is not shared with your neighbors. It does not degrade when subscriber density increases. It does not go offline when the solar weather turns bad. It does not require a clear view of the sky from your roof. It runs underground — and the only thing that makes it better is trenching it deeper, so that no poles, no ice, no tornado, and no falling tree can ever touch it.

That is not a political statement. That is basic network engineering.

What Missouri's BEAD Plan Gets Right

To be fair: Missouri's Office of Broadband Development (OBD) submitted a final BEAD proposal that prioritized fiber for 81% of targeted locations. That is the right instinct. The problem is federal restructuring that now allows satellite providers to challenge those awards and potentially redirect funds.

Missouri should hold the line. The 81% fiber target should be a floor, not a starting point for negotiation with SpaceX. The state has the leverage to demand real performance standards — and it should use it.

SECTION 4: THE NETWORK ARCHITECT'S POLICY ASK

Based on 20 years of building networks that cannot fail, here is what I will fight for in Jeff City:

1. Reject Shared-Medium Equivalency in BEAD Awards

Missouri should not release BEAD funds to LEO satellite providers on the grounds that they can sometimes hit 100/20 Mbps in ideal conditions on a shared medium. The standard must be sustained, dedicated throughput — not theoretical peak performance. Fiber first. Always.

2. Require Real SLAs for Any Alternative Technology

If satellite or fixed wireless providers receive BEAD funds, they must provide binding **SLAs (Service Level Agreements)** guaranteeing minimum sustained speeds, uptime percentages, and outage response times — with financial penalties for non-compliance. No SLA, no BEAD dollars.

3. Mandate Missouri-Based Provider Preference

BEAD grant criteria should include meaningful preference for providers headquartered in Missouri, with local workforce, local accountability, and member-owned cooperative structure. Public infrastructure money should build locally owned infrastructure — not subsidize out-of-state corporations extracting revenue from rural Missourians.

4. Fix the Ameren Pole Attachment Chokepoint

Pass state legislation preventing investor-owned utilities from using pole attachment fees to block local co-op fiber expansion. Remove the chokepoint. Make the Warsaw underground workaround unnecessary by fixing the law that created the problem.

5. Demand FCC Map Reform and Capacity Verification

Missouri's congressional delegation must push for **FCC (Federal Communications Commission)** map reform requiring actual capacity testing, not provider self-reporting. BEAD funding decisions should not be made based on maps that overstate coverage by 33%. A location is not "served" because a provider claimed it could theoretically deliver a speed tier. It is served when it actually delivers that speed under real subscriber load.

6. Address the BABA Supply Chain Problem

Missouri's congressional delegation and state leadership must push hard on the **BABA (Build America, Buy America Act)** bottleneck. Local providers are ready to build. The supply chain for compliant fiber needs to catch up. That takes federal pressure and state advocacy working together.

THE BOTTOM LINE

Rural broadband is not a simple problem. But it is a solvable one — if the people making policy understand the technology well enough to demand the right standards.

Treating LEO satellite as equivalent to dedicated fiber because it can theoretically hit a speed threshold on a shared medium is not technology neutrality. It is technology illiteracy dressed up as policy. It will result in rural Missourians being handed infrastructure that fails during storms, fails during power outages, fails under solar weather, degrades as more subscribers join the coverage cell, and sends every dollar they pay to a corporation headquartered a thousand miles away — with no SLA, no recourse, and no local accountability.

I ran JICC operations. I know what a network that cannot fail looks like. I know what the difference between a dedicated circuit and a shared pipe means in real life. And I know that the people of HD123 deserve the same standard of reliability that I spent 20 years building for the United States military.

Not satellite. Not 5G towers on a hilltop. Fiber in the ground. Permanent. Dedicated. Locally owned. Built to last generations. And if we can trench it so there are no poles — no tornado damage, no ice line, no tree bringing down your connection for three days — even better.

| *We don't settle for dirt roads. We don't settle for shared pipes either.*

ACRONYM REFERENCE

All acronyms used in this article, explained:

- ▶ AJO — Advanced JICC Operator: Senior Air Force communications role managing multi-platform joint networks
- ▶ BABA — Build America, Buy America Act: Federal law requiring domestically sourced materials for federally funded infrastructure
- ▶ BEAD — Broadband Equity, Access, and Deployment: \$42.5 billion federal program to expand broadband to unserved areas
- ▶ FCC — Federal Communications Commission: Federal agency that licenses satellite earth stations and maintains the National Broadband Map used to allocate BEAD funding
- ▶ FERC — Federal Energy Regulatory Commission: Federal agency that licenses major energy infrastructure including Bagnell Dam
- ▶ FTTH — Fiber to the Home: Dedicated fiber optic connection run directly to a residence
- ▶ GEO — Geostationary Orbit: Satellite orbit at ~35,000 km; used by HughesNet/Viasat; high latency, wide footprint
- ▶ Gbps — Gigabits per second: Unit of network speed; 1 Gbps = 1,000 Mbps
- ▶ HD123 — Missouri House District 123: Camden County state legislative district
- ▶ JICC — Joint Interface Control Cell: Military communications hub managing interoperability across multiple platforms and branches
- ▶ Kbps — Kilobits per second: Unit of network speed; 1 Kbps = 0.001 Mbps. SAT-J ran at 2.4 Kbps. Your Co-Mo fiber runs at 1,000,000 Kbps.
- ▶ LEO — Low-Earth Orbit: Satellite orbit at ~340–570 km altitude; used by Starlink and Amazon Kuiper
- ▶ Mbps — Megabits per second: Common unit of internet speed measurement
- ▶ mmWave — Millimeter Wave: Highest-frequency 5G band; fastest but range measured in hundreds of feet; blocked by trees and buildings
- ▶ NCS — Net Control Station: The designated poller in a half-duplex military data link net; controls who transmits and when
- ▶ NTIA — National Telecommunications and Information Administration: Federal agency overseeing BEAD program
- ▶ OBD — Office of Broadband Development: Missouri state office managing BEAD implementation
- ▶ SAT-J — Satellite Tactical Data Link J: Military satellite communications link using half-duplex polling architecture at 2.4 Kbps
- ▶ SLA — Service Level Agreement: Binding contract guaranteeing minimum service performance standards
- ▶ USAF — United States Air Force

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